

Application No.: 09/758,606

Filed: January 11, 2001

TC Art Unit: 2615

Confirmation No.: 9889

REMARKS

The foregoing Amendment is filed in response to the official action dated June 4, 2007. Reconsideration is respectfully requested.

The status of the claims is as follows:

Claims 1-25 and 27 are currently pending.

Claims 1-25 and 27 stand rejected.

Claims 1, 3-4, 8-9, 11-12, 15-16, 20, and 25 have been amended.

Claims 2, 22-23, and 27 have been canceled without prejudice.

The Examiner has rejected claims 1-4, 7-10, 12-14, 25, and 27 under 35 U.S.C. 103(a) as being unpatentable over Manabe (USP 6,678,381) in view of Kamakura et al. ("Suitable Modulation of the Carrier Ultrasound for a Parametric Loudspeaker") and Muggli et al. (USP 4,081,626). The Applicant respectfully submits, however, that base claims 1 and 25, as amended, and the claims depending therefrom, recite non-obvious subject matter that distinguishes over the art of record, and therefore the rejections of claims 1-4, 7-10, 12-14, 25, and 27 under 35 U.S.C. 103 should be withdrawn.

For example, amended base claim 1 recites a parametric audio system for generating at least one airborne audio beam that

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WEINGARTEN, SCHURGIN,
GAGNEBIN & LEPOVICKI LLP
TEL. (617) 543-2290
FAX. (617) 451-0313

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includes at least one audio signal source for providing at least one audio signal, at least one signal conditioner for receiving the audio signal and for nonlinearly processing the audio signal to provide at least one pre-distorted signal, a modulator for receiving the pre-distorted signal and for converting the pre-distorted signal into ultrasonic frequencies, and an acoustic transducer array including a plurality of acoustic transducers. The acoustic transducer array is configured to receive the converted signal and to project the converted signal through the air along a selected path, thereby inverting distortion in the projected signal and regenerating the audio signal along at least a portion of the selected path with reduced net distortion. The acoustic transducer array has a bandwidth greater than 5 kHz.

As recited in amended base claim 1, the acoustic transducer array includes a backplate having a surface and a succession of depressions formed on the surface, in which the respective depressions have different depths. The acoustic transducer array further includes a membrane with at least one conductive surface adjacently disposed along the backplate. The membrane and the succession of depressions define the plurality of acoustic transducers, and each of the plurality of acoustic transducers has an associated center frequency determined at least in part by the

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WEINGARTEN, SCHURGIN,
GAGNEBIN & LEBOVICI LLP
TEL. (617) 542-2290
FAX. (617) 452-0313

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depth of the respective depression. The depressions formed on the surface of the backplate alternate in succession between at least one depression having at least one first specified depth and at least one depression having at least one second specified depth. In addition, the spacing between the center frequencies determined at least in part by the first specified depth and the second specified depth is sufficient to obtain an aggregate frequency response of the acoustic transducer array having the bandwidth greater than 5 kHz. The subject matter of amended claim 1 is described throughout the present application, for example, see page 22, line 5, to page 23, line 26, and Fig. 7, of the application.

The Examiner acknowledges that the Manabe reference does not disclose at least one signal conditioner for receiving the audio signal and for nonlinearly processing the audio signal to provide at least one pre-distorted signal, as recited in amended base claim 1. The Examiner further acknowledges that the Manabe reference does not disclose specific hardware for the plurality of acoustic transducers. Nevertheless, the Examiner asserts that the Muggli reference discloses a Sell-type transducer including a backplate, and a plurality of depressions formed in the surface of

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WEINGARTEN, SCHURGIN,
GAGNEBIN & LEBOVICI LLP
TEL. (617) 542-2290
FAX. (617) 451-0313

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the backplate, in which the respective depressions have variable depths.

The Applicant respectfully submits, however, that neither the Manabe reference, the Kamakura reference, nor the Muggli reference teaches or suggests a parametric audio system that includes an acoustic transducer array having a backplate with a surface, and a succession of depressions with different depths formed on the backplate surface, in which the depressions alternate in succession between at least one depression having at least one first specified depth and at least one depression having at least one second specified depth, and the spacing between the center frequencies determined at least in part by the first specified depth and the second specified depth is sufficient to obtain an aggregate frequency response of the acoustic transducer array having the bandwidth greater than 5 kHz, as recited in amended base claim 1.

For example, the Muggli reference discloses a Sell-type electrostatic transducer in which shallower grooves are provided near the periphery of the backplate to improve the directional characteristics of the transducer, specifically, the reduction of side-lobes by reducing output near the edges of the transducer. The Applicant respectfully submits, however, that the Muggli

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WEINGARTEN, SCHURGIN,
CAGNIBIN & LEBOVITZ LLP
TEL. (617) 542-2290
FAX. (617) 451-0313

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reference neither teaches nor suggests providing depressions in the backplate surface with different depths, alternating between at least one first specified depth and at least one second specified depth, such that the spacing between the center frequencies determined at least in part by the first and second specified depths is sufficient to obtain an aggregate frequency response having the relatively wide bandwidth greater than 5 kHz, as recited in amended base claim 1.

The Applicant respectfully points out that Muggli et al. are not concerned at all with acoustic bandwidth, nor are they concerned with a parametric array. Instead, Muggli et al. are concerned with a significantly different problem of reducing the prevalence of side-lobes by making the transducer less sensitive near the edges, thereby "softening" the response (see, e.g., column 6, lines 44-54, of Muggli et al.).

In view of the deficiencies of the Manabe, Kamakura, and Muggli references, the Applicant respectfully submits that the combined teachings of the Manabe, Kamakura, and Muggli references would not suggest to one of ordinary skill in this art at the time of the invention the subject matter of amended base claim 1 and the claims depending therefrom. For at least the reasons discussed above with reference to amended claim 1, the Applicant

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WEINGARTEN, SCHURGIN,
GAGHERIN & LEBOVICZ LLP
TEL. (617) 542-2290
FAX. (617) 451-0313

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further submits that the combined teachings of the Manabe, Kamakura, and Muggli references would not suggest to one skilled in this art at the time of the invention the subject matter of amended base claim 25 (and amended base claim 20 and the claims depending therefrom). Accordingly, it is respectfully submitted that the rejections of claims 1-4, 7-10, 12-14, 25, and 27 (and claim 20 and the claims depending therefrom) under 35 U.S.C. 103 should be withdrawn.

The Examiner has rejected claim 5 under 35 U.S.C. 103(a) as being unpatentable over Manabe in view of Kamakura et al. and Muggli et al., and further in view of West (USP 4,258,332), Singhi et al. (USP 5,345,510), or Farrar (USP 5,910,991). In addition, the Examiner has rejected claim 6 under 35 U.S.C. 103(a) as being unpatentable over Manabe in view of Kamakura et al. and Muggli et al., and further in view of Babcock et al. (USP 3,565,209). In addition, the Examiner has rejected claim 11 under 35 U.S.C. 103(a) as being unpatentable over Manabe in view of Kamakura et al. and Muggli et al., and further in view of Miller et al. (USP 5,338,287).

In addition, the Examiner has rejected claims 15-17 and 19 under 35 U.S.C. 103(a) as being unpatentable over Manabe in view of Kamakura et al. and Muggli et al., and further in view of

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WEINGARTEN, SCHURGIN,
GAGNEPAIN & LESOVICI LLP
TEL. (617) 542-2290
FAX. (617) 451-0313

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Civitello (USP 4,289,936) or Strickland (USP 4,323,736). In addition, the Examiner has rejected claim 18 under 35 U.S.C. 103(a) as being unpatentable over Manabe in view of Kamakura et al. and Muggli et al., and further in view of Civitello (USP 4,289,936) or Strickland (USP 4,323,736) and Thompson (USP 4,122,725). In addition, the Examiner has rejected claims 20-23 under 35 U.S.C. 103(a) as being unpatentable over Manabe in view of Kamakura et al. and Muggli et al., and further in view of Miller et al. and Norris et al. (USP 6,229,899). Finally, the Examiner has rejected claim 24 under 35 U.S.C. 103(a) as being unpatentable over Manabe in view of Kamakura et al. and Muggli et al., and further in view of Miller et al. and Norris et al. and Beaver (USP 4,005,382).

First, the Applicant wishes to traverse the Examiner's taking Official Notice (1) that it is well known in the art to provide a matching filter, which serves to compensate for the specific transducer transfer characteristic and thus provide a flat overall frequency response that tailors to match the output shaping characteristics of an amplifier, (2) that it is well known in the art that the plurality of electro-acoustic transducers may be arrayed, and the number thereof can be adjusted to obtain the desired sound pressure such as a loudness greater than

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(2.0×10^4) $\text{Pa}^2 \text{xin}^2$, (3) that it is well known in the art to provide an inductor coupled to a capacitive load of the acoustic transducer array in order to provide the desired power oscillation, and (4) that it is well known in the art to provide a delay circuit configured to apply at least one predetermined time delay to the at least one converted signal in order to control the directivity of the transducer.

In addition, the Applicant wishes to traverse the Examiner's taking Official Notice that it is well known in the art to provide a blocking capacitor coupled between the driver amplifier and the acoustic transducer array in order to prevent DC from entering. In addition, the Applicant wishes to traverse the Examiner's taking Official Notice that it is well known in the art to have a transducer that can efficiently generate and receive ultrasound in air over a broad band of frequencies to generate a desired bandwidth such as a bandwidth greater than 5 kHz in order to obtain a desired sound quality.

Notwithstanding the above, the Applicant respectfully submits that neither the West reference, the Singhi reference, the Farrar reference, the Babcock reference, the Miller reference, the Civitello reference, the Strickland reference, the Thompson reference, the Norris reference, nor the Beaver reference, taken

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WEINGARTEN, SCHURGIN,
CAGNINI & LEBOVICI LLP
TEL. (617) 542-2290
FAX. (617) 451-0313

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alone or in combination, cures the deficiencies of the Manabe, Kamakura, and Muggli references, and therefore the teachings of the West, Singhi, Farrar, Babcock, Miller, Civitello, Strickland, Thompson, Norris, and Beaver references, combined as suggested above with the Manabe, Kamakura, and Muggli references, would not suggest to one skilled in this art at the time of the invention the subject matter of claims 5-6, 11, and 15-24. Accordingly, it is respectfully submitted that the rejections of claims 5-6, 11, and 15-24 under 35 U.S.C. 103 should be withdrawn.

In view of the foregoing, it is respectfully submitted that the present application is in a condition for allowance. Early and favorable action is respectfully requested.

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The Examiner is encouraged to telephone the undersigned Attorney to discuss any matter that would expedite allowance of the present application.

Respectfully submitted,

FRANK JOSEPH POMPEI

By: 

Richard E. Gagnebin

Registration No. 39,196

Attorney for Applicant(s)

WEINGARTEN, SCHURGIN,
GAGNEBIN & LEBOVICI LLP
Ten Post Office Square
Boston, MA 02109
Telephone: (617) 542-2290
Telecopier: (617) 451-0313

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WEINGARTEN, SCHURGIN,
GAGNEBIN & LEBOVICI LLP
TEL. (617) 542-2290
FAX. (617) 451-0313

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